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(54) COLORED MIRROR AND PRODUCTION OF COLORED MIRROR

(57)Abstract:
PURPOSE: To form TiO_2 films and SiO_2 films on a glass substrate and to easily produce a colored mirror by successively dipping a glass substrate in solns. of high refractive index material, low refractive index material and high refractive index material to form films on both surfaces of the substrate and then sticking a reflecting sheet on one surface of the substrate after the films are formed.

CONSTITUTION: After a glass substrate 1 is dipped in a soln. containing a high refractive index material such as TiO_2 then dried to remove the solvent and further baked to form films 2a, 2b of the high refractive index material. Then the substrate is dipped in a soln. containing a low refractive index material such as SiO_2, dried and baked to form films 3a, 3b of the low refractive index material. Further, the substrate is dipped in a soln. containing a high refractive index material such as

TiO_2, dried and baked to form films 4a, 4b of the high refractive index material. Then, a reflecting sheet 5 is stuck to one of the surfaces to produce a colored mirror. By this method, films can be easily formed on the glass substrate 1 and the colored mirror can be easily produced at a low cost.

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CLAIMS

[Claim(s)]

[Claim 1] The coloring mirror which make a solution immersed in order of the high refractive-index matter, the low refractive-index matter, and the high refractive-index

matter, and both sides of a glass substrate are made to form membranes, and is further characterized by sticking a reflective sheet on one field after membrane formation.
[Claim 2] Said reflective sheet is a coloring mirror according to claim 1 characterized by having the scattering prevention effectiveness.
[Claim 3] Make a glass substrate immersed in the solution containing the high refractive-index matter, and you make the high refractive-index matter film form, make it immersed in the solution containing the low refractive-index matter after that, and the low refractive-index matter film is made to form. Subsequently The coloring mirror manufacture approach characterized by making it immersed in the solution which contains the high refractive-index matter again, making the high refractive-index matter film form, sticking a reflective sheet on one field after membrane formation further, and forming a coloring mirror.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the coloring mirror used for for example, the reflector glass for automobiles, stained glass, etc., and its manufacture approach.
[0002]
[Description of the Prior Art] In recent years, many coloring mirrors are used for the

reflector glass of the mirror ball used in an interior supply, the mirror of the point cutting its hair, a party hole, etc., and an automobile etc. Such a coloring mirror forms TiO_2 (titanium dioxide) film, SiO_2 (diacid-ized silicon) film, etc. in the front face of a glass substrate, or one field of on the back with a vacuum deposition method conventionally, and what applied the black coating on it is known. And an amorous glance changes with the thickness of this vacuum evaporationo film, for example, if thickness is thick, it will become red, and it will become blue if thin. Therefore, in order to create the coloring mirror of each amorous glance, the thickness by said vacuum deposition must be adjusted so that it may become the thickness which suited an amorous glance, respectively.

[0003]

[Problem(s) to be Solved by the Invention] However, in the manufacture approach of such a conventional coloring mirror and a coloring mirror, since long duration is taken to form the film in a glass side since the vacuum deposition method is used and a facility takes many costs, there is a fault of being disadvantageous, economically. Furthermore, although the sputtering method, a CVD method, etc. are in a glass substrate as other approaches of forming the film, in these approaches, a fault, such as requiring much cost which thickness formation takes a long time, is not canceled like the above-mentioned vacuum deposition method. The place which it is made in order that this invention may solve such a conventional technical problem, and is made into that purpose is to offer the manufacture approach of the coloring mirror which can form TiO_2 film and SiO_2 film to a glass substrate by the easy approach, and a coloring mirror.

[0004]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, are the order of the high refractive-index matter, the low refractive-index matter, and the high refractive-index matter, make both sides of a glass substrate, as for the coloring mirror of this invention, immersed in a solution, membranes are made to form, and it is the description further to have stuck the reflective sheet on one field after membrane formation. The manufacture approach of the coloring mirror of this invention makes a glass substrate immersed in the solution containing the high refractive-index matter, makes the high refractive-index matter film form, makes it immersed in the solution containing the low refractive-index matter after that, and makes the low refractive-index matter film form. Moreover, subsequently It is characterized by making it immersed in the solution which contains the high refractive-index matter again, making the high refractive-index matter film form, sticking a reflective sheet on one field after membrane formation further, and forming a coloring mirror.

[0005]

[Function] According to the coloring mirror and its manufacture approach of this invention constituted like ****, after making a glass substrate immersed in the solution containing the high refractive-index matter of TiO2 grade, it is made to dry and a solvent is removed, further, it is made to calcinate and the film of the high refractive-index matter is formed. Subsequently, it is made to be immersed in the solution with which the low refractive-index matter of SiO2 grade etc. is contained, and repeat desiccation and baking similarly, and you make the film of the low refractive-index matter form, and make it further immersed in the solution with which the high refractive-index matter of TiO2 grade is contained, desiccation and baking are performed, and the film of the high refractive-index matter is made to form. Then, a reflective sheet is stuck on one of fields, and a coloring mirror is formed.

[0006]

[Example] Hereafter, the example of this invention is explained based on a drawing. Drawing 1 is the explanatory view showing the configuration of one example of the coloring mirror to which this invention was applied. Like illustration, TiO2 film 2a as high refractive-index matter and 2b (refractive indexes 2.3-2.5) are formed by the glass substrate 1, SiO2 film 3a and 3b (refractive indexes 1.4-1.5) as low refractive-index matter is formed on it, and, as for this coloring mirror, TiO2 film 4a and 4b is further formed on it. And the reflective sheet 5 which used the black scattering prevention effectiveness also [field / of the glass substrate 1 with which each film was formed / one] is stuck on both sides, and when it sees from the line of sight in drawing, this light reflects.

[0007] Next, it explains, referring to the flow chart shown in drawing 2 about the process which manufactures this coloring mirror. First, the processing which defecates a front face for the glass substrate 1 cut by predetermined size with abrasives etc. is added (step ST 1). And this glass substrate 1 is made immersed in the immersion tub with which titanium liquid (MOF Ti) was filled up, and is pulled up at the rate of predetermined (step ST 2). Under the present circumstances, the thickness formed by the front face of a glass substrate 1 changes in proportion [almost] to a raising rate, as shown in drawing 3 . For example, if a raising rate is set to 14 [cm/min], the thickness of 80 [nm] can be obtained, if it pulls up from this at a quick rate, thickness will become thick further, and thickness will become thin if it pulls up at a rate late on the contrary.

[0008] Then, TiO2 film 2a and 2b are formed by the front face of a glass substrate (step ST 3) 1 by adding desiccation and baking processing. It is made to dry 10 minutes or more at the temperature of 100 - 120 degrees, and desiccation processing removes an

unnecessary solvent. Baking processing makes a front face form TiO_2 film 2a and 2b by calcinating 30 minutes or more at the temperature of 400 - 450 degrees. Subsequently, the glass substrate 1 after TiO_2 film 2a and 2b were formed is made immersed in the immersion tub with which silica liquid (MOF p-Si) was filled up, and it pulls up at the rate of predetermined like the time of forming said TiO_2 film 2a and 2b (step ST 4). The relation between the raising rate at this time and thickness is as being shown in drawing 4 , and too, thickness becomes thick, so that a raising rate is quick. Then, desiccation and baking are performed similarly (step ST 5), consequently SiO_2 film 3a and 3b is formed on said TiO_2 film 2a and 2b.

[0009] And the glass substrate 1 with which SiO_2 film was formed is made immersed in the immersion tub with which titanium liquid was filled up further, and desiccation and baking are performed (step 6 and STs 7). In this way, since TiO_2 film 4a and 4b is formed, the glass substrate 1 which TiO_2 film 2a, 2b, SiO_2 film 3a and 3b, and TiO_2 film 4a and 4b were formed by the front face of a glass substrate 1 and the rear face in this order, and was formed by three layers can be formed. Then, the reflective sheet 5 of black scattering prevention combination is stuck on one field among a front face or a rear face (step ST 8). The coloring mirror can be created by this.

[0010] Next, the relation of the thickness of a coloring mirror and the wavelength of the reflected light which are created by doing in this way is explained. Now, in a refractive index, if n and thickness are set to d [nm] and wavelength is set to lambda [nm], the relation of the following (1) type will be materialized.

Nd=lambda/4 -- Since the refractive indexes of SiO_2 are 1.4-1.5, if the refractive index of (1) and TiO_2 assigns this value to 2.3-2.5 at (1) type, the relation between Thickness d and wavelength lambda will be obtained, and since the relation between wavelength lambda and an amorous glance is common knowledge, the relation between the amorous glance of a coloring mirror and thickness can be obtained from this relation. That is, the coloring mirror of various amorous glance can be manufactured. Next, the relation between wavelength lambda and a reflection factor is explained. Drawing 5 is the property Fig. showing the relation of the wavelength of a blue mirror and the reflection factor which were formed by three layers in order of TiO_2, SiO_2, and TiO_2. Like illustration, the reflection factor is made into the peak for wavelength in this coloring mirror in the band of 460-480 [nm]. This wavelength conforms to the specification of the reflector glass of an automobile, and is wavelength very gentle to human being's eyes. Therefore, if the coloring mirror constituted in this way is applied to the reflector glass of an automobile, a burden will not be placed on a driver but the comfortable back check by looking which reduced dazzle will be attained.

[0011] Thus, in this example, a coloring mirror can be manufactured comparatively easily, without using a vacuum deposition method, the sputtering method, a CVD method, etc. like before, since a glass substrate 1 is made immersed in titanium liquid and silica liquid and TiO_2 film 2a, 2b, 4a and 4b, and SiO_2 film 3a and 3b are formed. Thereby, it becomes possible to attain reduction-ization of manufacture costs. Moreover, adjustment of thickness can be easily performed by adjusting the raising rate at the time of pulling up from the immersion tub with which the solution was filled up. Moreover, by sticking the black reflective sheet which served as the scattering prevention effectiveness, if a coloring mirror should be damaged, the fragments of glass cannot be scattered on a perimeter and risk can be avoided.

[0012]

[Effect of the Invention] Since the membrane formation to a glass substrate becomes easy according to this invention as explained above, compared with a conventional vacuum deposition method, the conventional sputtering method, etc., a coloring mirror can be manufactured by easy and low cost. Moreover, since adjustment of thickness is easy, wavelength can form a coloring mirror suitable as a reflector glass of an automobile, for example, if a reflection factor sets up thickness near 470 [nm] so that it may become max. Moreover, since the black reflective sheet of the scattering prevention effectiveness combination is stuck on one field of a glass substrate, risk can be prevented at the time of breakage.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The explanatory view showing the configuration of the coloring mirror concerning one example of this invention.

[Drawing 2] The flow chart Fig. showing the process which manufactures the coloring mirror concerning one example of this invention.

[Drawing 3] The property Fig. showing the relation between the raising rate from titanium liquid, and the thickness of TiO_2 film.

[Drawing 4] The property Fig. showing the relation between the raising rate from silica liquid, and the thickness of SiO_2 film.

[Drawing 5] The property Fig. showing the relation between the wavelength of a blue mirror, and a reflection factor.

[Description of Notations]

1 Glass Substrate

2a, 2b TiO_2 film

3a, 3b SiO_2 film

4a, 4b TiO_2 film

5 Reflective Sheet